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MULL

Modern Uses of Logic in Law

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1a. WEIGHTING VARIABLES IN JUDICIAL PREDICTION

Most litigation situations revolve around legislative or judicial rules which specify that certain individual variables or combinations of variables will lead to certain judicial decisions. For example, a statute or a set of precedents may provide that murder is the unlawful killing of one human being by another with malice aforethought. There are five fact-variables mentioned in this legal rule: (1) unlawfulness, (2) a killing, (3) a human victim, (4) a human perpetrator, and (5) malice aforethought (R1). If all five variables are present in a murder case, the prosecution will win assuming the court follows the legal rule. If less than all five variables are present in a murder case, the prosecution will lose regardless how many other or what other variables are present. There is no weighting problem in applying the legal rule because there is no need for the predictor to say whether one of the five variables is more important to the decision than any other of the five variables. They must all be present for the prosecution to win, and if any one is absent, the prosecution loses.

Some litigation situations involve rules of law which do not specify exactly which combinations of variables will lead to one decision and which to the opposite decision. For example, in deciding whether there is a violation of due process in the extraction of a criminal confession, the U.S. Supreme Court has not specified which combinations of variables relating to the nature of the detention and the defendant will result in the confession being non-admissible (R2). There is a weighting problem in this situation because there may be a need for the predictor to say whether a certain combination of variables is more important to a decision for exclusion than some other combination where the court allowed the confession to be admitted.

Suppose the Supreme Court had decided five criminal confession cases (A, B, C, D, and E) involving four pro-exclusion variables (W, X, Y, and Z) according to the pattern shown in Table 1.

Table 1. FIVE HYPOTHETICAL CRIMINAL CONFESSION CASES

Past Cases (in time sequence)	Who Won on the Issue of Exclusion or Admission	Pro-Exclusion Variables W	X	Y	Z
A	Admission		Present		
B	Exclusion	Present	Present	Present	Present
C	Admission	Present	Present		
D	Exclusion	Present		Present	
E	Exclusion	Present		Present	Present

Suppose that one would like to predict how a precedent-following court will decide a future case F where variables X, Y, and Z are present. There is no weighting problem. None of the past cases alone indicates how case F will go. In case E, the side with the affirmative burden won with W, Y, and Z, but is X in case F equivalent to W? In case D, the affirmative side won with W and Y, but are X and Z in case F equivalent

to W? These questions can only be answered by some method which subjectively or quantitatively allocates weights to the variables.

A subjective weighting process might involve using the evaluation scale of the predictor, or it might involve examining the sentence structure and words of emphasis in the opinions of cases A, B, C, D, and E to find clues as to the evaluation scale of the opinion writers. A quantitative method of weighting might be more accurate, but how might a quantitative method be applied? Three basic methods have recently been proposed. The three methods might be called the voting distribution method, the factor analysis method, and the victory correlation method.

The voting distribution method was originated by Fred Kort (R3). It involves assigning weights to the variables in terms of the distribution of judicial votes in the past cases. For example, one variable is assigned more weight than another variable if the first variable was the only variable present in a case where the decision was a 9 to 0 unanimous decision in favor of the affirmative side and if the second variable was the only variable present in a case where the decision was only a 5 to 4 decision in favor of the affirmative side. There may seldom be a case, however, having only one variable present which is strong enough to allow a side to win which has the affirmative burden. Therefore, the weight of any given variable is made proportional to the ratio between the number of votes which the affirmative position received and the number of variables present in the past case which had the fewest other variables present and where the affirmative position won. If 2 variables were present in a case where there were 6 votes for the affirmative position, each receives a preliminary weight of 6/2. A subsequent calculation based on all the past cases is then made to take into consideration the fact that one of the two variables may have been more important in causing the court to decide for the affirmative position. A variant of Kort's voting distribution method involves expressing each past case in terms of an equation whereby the sum of the literal variables equals the number of votes the affirmative position received in the case. By solving all the equations simultaneously each literal variable can be given a numerical value which expresses its weight (R4). This variant, however, has no advantage over the voting distribution method, but it has all the disadvantages plus greater complexity.

The factor analysis method was also originated by Fred Kort (R5). It involves obtaining a set of tetrachoric correlation coefficients which express the positive or negative direction and the degree of intensity of the relationship of each variable with each other variable (R6). These correlation coefficients are then subjected to a complex mathematical procedure known as factor analysis whereby a set of further correlation coefficients are arrived at (R7). These correlation coefficients express the direction and intensity of the relationship of each variable with each common factor (an element which is involved in two or more variables) and with each unique factor (an element which is involved in only one variable). The variables are then weighted in terms of the direction and size of their correlations with the factors. The factors are in turn weighted in terms of the correlation between their presence and a victory for the affirmative position by a procedure known as multiple regression analysis (R8).

The third quantitative method of weighting variables where the court, whose decision is being predicted, has not explixitly done so itself, is the victory correlation method (R9). This method involves weighting the variables in terms of the correlation between their presence and a victory

for the affirmative position. For example, one variable is assigned more weight than another variable if the correlation between the presence of the first variable and a victory for the affirmative position is higher than the correlation between the presence of the second variable and a victory for the affirmative position. The direction and intensity of these correlations can be expressed by fourfold correlation coefficients if the variables are considered either present or absent (R10), or by biserial correlation coefficients if the variables are measured on a continuum (R11). For greater precision, each variable can be weighted in terms of its correlation with a victory for the affirmative position while the effect of the other variables is eliminated by a technique known as partial correlation (R12). For still greater precision, winning and losing can be measured on a continuum in terms of the probability of getting the voting split of each case by chance (R13). The lower the chance probability of the split, the greater is the victory (if a victory occurred) or the greater is the loss (if a loss occurred). If victory is measured on a continuum, the appropriate correlation coefficient is either biserial (R14) or Pearsonian (R15) depending on how the fact variables are measured.

Any subjective or quantitative method of predicting judicial decisions from past cases makes four assumptions each of which is likely to be false in some instances. First, prediction from precedents assumes that courts will follow their own precedents and the precedents of courts which hear appeals from them. Second, prediction from precedents assumes that one can pick out of the past cases all the pro-affirmative variables present and only the pro-affirmative variables present without overlaps between the variables. Factor analysis and partial correlation are helpful in eliminating overlaps, but the initial list of variables fed into the factor analysis or partial correlation formulas must be compiled by a subjective content analysis that is likely to produce a differing list for each analyst. Third, prediction from precedents assumes that one can pick out all of the pro-affirmative variables present in the case to be predicted. Each time a future case is decided with a new variable present, however, any of the weighting methods described can be used to weight the new variable as well as to give new weights to the old variables which take the contents and result of the future case (which is now a past case) into consideration. Fourth, any method of predicting from precedents assumes that the predictor can pick out all the cases that are precedents for the issue in controversy. Case classification, like variable isolation, has inherently subjective aspects.

Relative to each other, the three quantitative weighting methods described have certain advantages and disadvantages. The main advantage of the voting distribution method over the factor analysis method is that it takes into consideration the intensity of the victory or the loss of the affirmative position in the past cases. Its main disadvantage is that it makes intensity relative to the number of judges who sat on the past cases by merely considering the number of affirmative votes present in each case. The main advantage of the factor analysis method over the voting distribution method is that it eliminates the overlapping effect between the variables listed. Its main disadvantage is that it is extremely complex and time consuming to apply. On the other hand, the victory correlation method in its most elaborate form takes victory intensity into consideration without merely counting the affirmative votes as the voting distribution method does, and it holds constant all other variables while varying each one without being as complex and time consuming as the factor analysis method. When a method is perfected of numerically weighting variables

in past cases, a big step will have been taken toward devising a program whereby an electronic computer can aid in the prediction of future cases when it is given the contents and results of past cases and the contents of the case to be predicted.

Stuart Nagel
Northwestern University

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R2 Stein v. New York, 346 U.S. 156, 185 (1953); Fikes v. Alabama, 352 U.S. 191, 197 (1953); Thomas v. Arizona, 356 U.S. 390, 393 (1953).

R3 Kort, Predicting Supreme Court Decisions Mathematically: A Quantitative Analysis of the "Right to Counsel" Cases, 51 AM. POL. SCI. REV. 1-12 (1957); Fisher, The Mathematical Analysis of Supreme Court Decisions: The Use and Abuse of Quantitative Methods, 52 Am. POL. SCI. REV. 321-338 (1958); Kort, Reply to Fisher's Mathematical Analysis of Supreme Court Decisions, 52 AM. POL. SCI. REV. 339-348 (1958); Schubert, QUANTITATIVE ANALYSIS OF JUDICIAL BEHAVIOR 316-363 (1960).

R4 Davis, COLLEGE ALGEBRA, 125-133, 292-299 (1946); Moore, ALGEBRA, 52-65, 193-204 (1951).

R5 Kort, Quantitative Analysis of Judicial Opinions, 3 POL. RESEARCH: ORG. & DESIGN 11-14 (1960); Kort, Quantitative Content Analysis of Judicial Opinions, mimeographed, 1-54.

R6 Guilford, FUNDAMENTAL STATISTICS IN PSYCHOLOGY AND EDUCATION, 305-311 (1956); Walker and Lev, STATISTICAL INFERENCE, 273-274 (1953).

R7 Fruchter, INTRODUCTION TO FACTOR ANALYSIS (1954); Cattell, FACTOR ANALYSIS: AN INTRODUCTION AND MANUAL FOR THE PSYCHOLOGIST AND SOCIAL SCIENTIST (1952).

R8 Guilford, op. cit. supra, 390-415; Walker and Lev, op. cit. supra, 315-347.

R9 Nagel, Predicting Judicial Decisions with the Aid of Simple Arithmetic. 4 POL. RESEARCH: ORG. & DESIGN (to be published sometime in 1960). The victory correlation method is in effect a part of the discriminant analysis procedure mentioned by Fisher, op. cit. supra, 336.

R10 Guilford, op. cit. supra, 305-316, 334-340; Walker and Lev, op. cit. supra, 271-275.

R11 Guilford, op. cit. supra, 297-305, 340-356; Walker and Lev, op. cit. supra, 261-271.

R12 Guilford, op. cit. supra, 316-318; Walker and Lev, op. cit. supra, 340-344.

R13 Guilford, op. cit. supra, 237-238; Siegal, NON-PARAMETRIC STATISTICS FOR THE BEHAVIORAL SCIENCES, 42-47.

R14 Guilford, op. cit. supra, 297-305, 358-362; Walker and Lev, op. cit. supra, 261-271.

R15 Guilford, op. cit. supra, 135-151, 362-379; Walker and Lev, op. cit. supra, 230-260.

1b. ELECTRONIC LAW SEARCHING

The 83rd Annual Meeting of the American Bar Association in Washington, D. C., saw the first public demonstration of workable methods of searching statutes and case law with the aid of modern electronic computers. The basic method shown was one developed at the University of Pittsburgh in connection with the work of its Health Law Center.

All the state health laws were put on punched cards and fed into a general purpose IBM 650 to create a text tape containing the text of those statutes. Complete text was used on the premise that the specific words used in a statute are almost always a reliable clue to its subject matter. From this text tape the machine was programmed to construct a concordance or alphabetical word list of all the words of those statutes except those having no search value (words such as "a", "the", "by", "with"). The print-out of this list served as the basis for all inquiries. Three kinds of inquiries were then possible: How many statutory provisions containing the words selected did the machine contain? What were the citations to those provisions? What was the text of those provisions?

The importance of such an approach is that, by dispensing with coding, digests, and classification systems, it interposes nothing between the searcher and his materials. On the other hand, it places a correspondingly higher burden on the imagination, resourcefulness, and care of the searcher. Because the machine deals only with specific symbols and can solve none of the semantic problems created by synonyms and ambiguities, the searcher must anticipate every possible descriptive word variant, including misspellings, that the particular kind of provision sought might contain. Thus, framing an adequate inquiry entails not only identifying the underlying concepts that each statute sought must contain (these must be couched in the conjunctive) but anticipating for each such concept all the synonymous expressions that the several legislatures have probably used to express it (these must be couched in the disjunctive). Moral: the machine replaces neither the lawyer nor any basic step of legal analysis.

When properly framed, the inquiry is put on punched cards and fed into the machine in the same way as the original materials. The machine then takes over. The particular search demonstrated in Washington involved a split-listing tax problem, and the process of searching, selecting, and printing the citations and text of the 19 relevant statutes took only 26 minutes, as against a manual state-by-state search of several days.

Also demonstrated were modified applications of this technique to the searching of food product liability and oil and gas case law. Here,

instead of the full text of the opinions, the punched cards and text tape contained only case digests. The answers produced by the machine were correspondingly restricted. This approach is more economical than that used for searching the health statutes because it drastically cuts the time and expense of cutting punched cards and of building the basic word list. It also gives the searcher the benefit of a professional digester. On the other hand, it has the disadvantage of exposing him to the fallibilities of the digester, who may be somewhat less resourceful, with respect to the problem at hand, than the particular searcher. The further development and greater accessibility of punched tape and electronic scanners may some day make practicable the word-for-word committal of even judicial opinions to tape.

Finally, a search of design patent decisions was conducted by the United States Patent Office. It used a RAMAC 305 and a somewhat different method of digesting and classifying the source materials.

The demonstrations showed that electronic searching is workable technically and that it retains the advantages of a traditional manual search without taking a long time or failing to uncover all the relevant materials. The problem now is to determine under what conditions a legal problem justifies the use of these machines. At present these appear to be the important factors: the general importance of the problem, the money involved, the scattering of the materials among many jurisdictions, the need for comprehensiveness, and the need for speed.

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Ic. LOGIC IN LAW SCHOOLS IN POLAND

From 1946 logic has been a required part of the curriculum in law schools in Poland (Warsow, Cracow, Poznan, Lodz, Lublin, Wroclaw, Torun). There are 60 hours of lectures and classes of this subject in the first year of law studies. Initially the lectures in logic for lawyers were given only by professional logicians. The first handbook of logic for lawyers was prepared by Professor Tadeusz Kotarbinski. There was no great difference between the lectures in logic (in the broad meaning of this term) in the law schools and in the other faculties of Polish universities.

Actually, two different tendencies can be observed:

1. the old one - to give lectures in elementary logic as a subject of general education for young students, and
2. the tendency to adapt the program of logic to the specific professional needs of the lawyers.

The latter tendency is represented not only by lawyers teaching the elements of logic in law schools, but also by many professional logicians (Section of "practical logic" in the Institute of Logic in the Polish Academy of Sciences - director: Professor Maria Kokoszynska). The practical needs - in relation to the Polish law system - require a limitation of the part concerning theoretical foundations of formal logic in the elementary lectures, to the extent that the material is not necessary as a starting point

for methodology and theory of argumentation, and an improvement of the part concerning semantic problems, especially problems of semantic analysis of norms and imperatives, logical problems of legal interpretation (elements of deontic logic), etc., and of the part concerning logical problems of juridicial proofs. There are some difficulties in the realisation of this tendency caused by the fact that logic is taught at the beginning of law studies when students do not have sufficient knowledge of juridicial problems. It is very difficult to give in a rather short time not only the basic informations about semantics, formal logic, general methodology, and theory of argumentation, but also the analysis of practical professional problems. It requires the intensification of the didactic process through many practical exercises performed by the students outside of school hours.

Handbooks of logic for lawyers in Polish:

Gregorowicz J.: Zarys logiki dla prawnikow, III edit. 1957
Kotarbinski T.: Kurs logiki dla prawnikow, IV edit. 1960
Wolter W.: Elementy logiki (wyklad dla prawnikow), III edit. 1960
Ziembinski Z.: Repetitorium z logiki dla studentow prawa 1952
Zbior zadan z logiki dla studentow prawa 1954
Logika praktyczna, IV edit. 1960

Zygmunt Ziembinski
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ld. HISTORY OF ELECTRONIC METHODS FOR LEGAL RESEARCH*

The history of efforts to apply electronic data retrieval methods to legal research has largely been one of seeking to develop a system by which references bearing on a given question could be selected and produced without regard to their source or nature.

The reason for this is that one of the great obstacles to rapid and effective research today is the almost endless variety of index arrangements which are in use for different kinds of material. Reported decisions of the state courts are arranged according to one index pattern; state statutes are indexed according to a different pattern; federal decisions except for the Supreme Court have a third index format; Supreme Court decisions have a fourth; federal statutes are indexed differently from state statutes, and administrative rules and regulations, along with municipal ordinances, have yet another hierarchy of indexes when they have any at all.

Manual methods appear to be unable to deal with this situation, with the result that research on even a fairly simple legal question can involve laborious checking through this great variety of search systems. To some degree, of course, the existence of different systems merely reflects the fact that private publishers understandably must make their indexes different from those of other publishers in order to secure copyright pro-

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* Address before the Section of Bar Activities, Committee on Electronic Data Retrieval American Bar Association, Monday, August 29, 1960.

tection and to avoid copyright infringement.

With the coming of equipment that can handle large volumes of material at great speed, a possible solution to this problem was visualized. Neither a lawyer nor his client, nor a judge or legislator, is initially as concerned with the source of the law as with what the law is. This is the natural first question. Having ascertained the references which disclose what the law is, secondary questions which may be concerned with the source of that law can be dealt with easily.

Interest in the possible use of electronic equipment goes back about 9 years, when it was learned that a similar interest had culminated in an experimental project dealing with research in chemical literature. The progress of that effort has been followed closely, largely because of the remarkable similarities between the search process for chemical literature and for legal literature, and a great deal has been learned along the way.

Progress in experimental work has so far been slow, possibly due to the fact that the customary equipment is mainly intended to handle numbers and figures rather than ideas or concepts and the words which represent them. Nevertheless, a number of experiments, although very modest in scale, have satisfactorily shown that systems can be designed to select legal materials. Except for the system worked out by John Horty and his staff at the University of Pittsburgh, these experiments have been performed, not with machines but with very simple punched cards that are punched and sorted by a manual mechanical process.

The technique for recording and analyzing the results of legal research in connection with appellate brief writing was tested successfully. It has also been successfully applied by several persons to the recording and selection of facts in connection with a complicated trial. In 1953, a similar method was used to prepare a revision of New Jersey Court Rules dealing with appellate practice and related review procedures. In 1955, cards were applied to the preparation of a detailed index to an extensive report by a committee of the New Jersey Supreme Court on the proposed Uniform Rules of Evidence. Professor Vincent Fiordalisi has made use of manually punched cards at the Rutgers Law School as a means of indexing unreported decisions, legislative reports, and other like miscellaneous material that can be extremely valuable when there is some way of finding it.

Necessarily, none of these experiments could be expected to accomplish more than to indicate that the underlying idea of using computers for legal research was functionally sound. But because of the very limited scope of the manually punched card in relation to the very extensive breadth of the material in a general legal collection, these limited experiments could not go far in helping to develop a general system, let alone provide the information needed to compute costs, efficiency, speed and other important factors.

For a number of years, very serious experiments aimed at the development of a data retrieval system have been conducted by the U.S. Patent Office. The major interest here, of course, is aimed at searchers of prior patents and similar literature, and accordingly deals primarily with scientific rather than legal material. However, a number of students of the subject have felt that when a full-fledged search system for the Patent Office has been brought into existence, it will necessarily have to include decisions and statutes on patent law as well as the technical materials within

the patents themselves. The demonstrations of patent law searches indicate that a real start has been made in this direction, and it is naturally encouraging to see that the original a priori expectations are tending to prove correct.

For general law, however, the work at University of Pittsburgh represents the greatest advance made anywhere, of which I am aware. It is quite clear that the system employed there can probably be put to use, certainly for statutory research, right now and that its progressive application and use are limited only by the funds made available to extend it.

Perhaps some examples of what can be done with that system in the statutory field can indicate best what we should expect machines to do as this new science becomes more refined and sophisticated. Ordinarily, a research effort is directed to some more or less specific subject coming within a somewhat broader field. Thus, the question may be concerned with the liability of hospitals for negligence, in the field of Health Law. Or, it may be directed to the effect of a proposed statute on existing provisions dealing with assessed values of property, in the field of Local Property Taxation. Again, it may have to do with the admissibility of statements in the nature of admissions, in the field of Trial but possibly in connection with almost any substantive subject. Thus, for example, the well-known principle of contract law dealing with the implied condition that the subject-matter of the contract shall continue to exist, may come up in any type of contract case. Our most recent judicial pronouncement in New Jersey happened to involve a contract between an international and a local union, and with customary systems the only heading under which the case appears is "Labor Relations". But the same principle is applicable to contracts between landlord and tenant, to sales contracts, and so on. Thus, this general principle cannot be put "under" any particular heading, or else it will never be found except when it is sought in connection with the same narrow question where it arose.

The consequence is that in order to have a fair chance of finding pertinent references, means must be available to draw from the entire collection without being compelled to enter specific doorways and to travel along designated corridors.

The point is not new. It was ably made by Mr. Justice Holmes in 1873, when he was editor of the American Law Review. Commenting on the custom of gathering rules of law under various topics, he said:

> "Thus, contract is a proper head, because the fact that a certain agreement has been made, has attached to it a series of legal consequences which would not exist without it. Marine insurance is a proper subdivision of contract, because the fact that the agreement was of that sort has attached to it further and more specific consequences ***. Telegraphs, on the other hand, is not a proper head under which to collect what is generally included there, because most of the cases stated are simply illustrations of the law of principal and agent or of contract, if the decisions are right. The circumstance that a telegraphic company was concerned is purely dramatic, and has no legal significance." (7 Am. Law Rev. 318)

This means that, our present systems being what they are, a truly

complete search for statutory provisions on some point of hospital law, for example, should be conducted by looking at all the statutes of the state involved. This is merely another way of saying that we cannot rely on the present index. With the system tested at the University of Pittsburgh, such a search is entirely possible. To conduct it, of course, all of the state statutes of, say, Pennsylvania, must first be recorded by the equipment. The intriguing and attractive feature, however, is that once this has been done, the same record of all the statutes can be examined by the same machine for entirely different subjects.

What it all comes down to is that the system of gathering things together in separate places is no longer essential. The gathering together is a step which is postponed until the question is framed, and then the gathering is performed to match the question.

At the present stage of development it is inevitable that there will be more than one system advanced. This should not be the occasion for being compelled to make a decision now that legal research use some one of these systems to the exclusion of others. It is too early for that. The preliminary development of a number of systems is all to the good. The eventual system may well combine the best features of several. To this extent, the Pittsburgh technique has the virtue that it can be put to use right now, yet whatever work is put into its establishment does not close the door to its blending with other systems which also prove to be workable. It is of sufficient simplicity to have room for further refinement without discarding any part of the work that has gone before.

This review of the history of efforts to apply electronic devices to legal research discloses about what we should expect. Until a year or so ago, the progress and advancement was slow. Scholars were mainly occupied in getting acquainted with the new concepts and the strange terms. Now, the pace has clearly quickened, and a broadening of the support for the effort will go far to bring into existence what we might call the first Model T of the "Eureka" Automatic Law Finder. Those of us here today may not reap the full benefits during our active careers, but we can be sure that as each model improves upon the one before, the day will surely come when the judge, the legislator and the lawyer will each be able to devote a greater part of his working time to the professional function of analyzing and applying the law, and much less of it to the slow, laborious and expensive process of gathering the materials. Who knows--we may even get down to a five day week!

Vincent P. Biumno
Member of the New Jersey Bar

le. THE UCLA NATIONAL LAW AND ELECTRONICS CONFERENCE *

The first National Conference on Law and Electronics was held at the University of California Conference Center, Lake Arrowhead, California, October 21-23, 1960, under the chairmanship of Edgar A. Jones, Jr., Pro-

* Prepared for the CALIFORNIA STATE BAR JOURNAL and MULL.

fessor of Law at UCLA. This Conference represented the initiation of a long range program by UCLA's interdisciplinary Committee to Study Applications of Scientific Processes to the Administration of Justice.

The conference was designed to create a basic interdisciplinary dialogue among representatives of those fields related to the goal of utilizing electronic data retrieval processes for the administration of justice. The conferees were representatives of industry, electronics, physics, philosophy, publishing, engineering, history, library science, linguistics, business administration, the judiciary and the bar.

After welcoming comments by Dean Richard C. Maxwell, UCLA School of Law, Professor Jones stated a hypothesis for the conference to test, that the application of electronic processes to the law would achieve a significant improvement in the administration of justice. He stated that the UCLA Committee believed and that his expectation was that whether that hypothesis be proved or disproved, the conclusions reached would be of great value at this point in time for those concerned with the evolution of the law and with the development of new electronic processes.

The first topic explored was "Electronics and the Administration of Justice". The speaker was Richard F. C. Hayden, Esq. of Los Angeles, past Chairman of the American Bar Association's Electronic Data Retrieval Committee. Mr. Hayden, speaking on Friday evening, began by analogizing the scientific abstract to the legal headnote. By comparing scientific and legal research methodology, he exposed the failure and resultant frustration of prior efforts with existing methods. He discussed the various tools of legal research in terms of their present uses, limitations, and needs and primary emphasis placed on the need for greater accuracy and predictability. Among the questions raised by Mr. Hayden were: whether the new mechanisms under consideration by the Conference were the proper instruments for filling the needs of the legal profession; whether these mechanisms are economically feasible, and if so, to what extent; how great an amount of condensation of materials will have to be done by humans; and whether the goal of improved legal research on all problems will ultimately be accomplished?

Mr. Hayden's talk was followed by a panel composed of Vincent Biunno, Esq. of Newark, N.J., member of the ABA Electronic Data Retrieval Committee; Dr. Robert M. Hayes of the Electrada Corp., Los Angeles, and Felix Stumpf, Esq., University of California Extension, Berkeley, Calif.

Mr. Biunno expanded upon the shortcomings of specific tools of legal research and indicated how certain of these might be obviated by the use of electronic retrievers. In particular he cited certain shortcomings of citators and the need for a single system to overcome the lack of continuity and currency therein.

Dr. Hayes indicated that the operation of foreseeable electronic mechanisms would be useful and economically feasible only where there is a large volume of activity, clearly defined processes, and a great amount of self-generated activity. This last point was presented as a note of caution for those who might regard machines as a panacea which would solve all the problems of the legal profession. Such a belief would be erroneous, he felt, because the limitations of the input process would confine the abilities of the machine to aiding in the understanding, rather

than the solution, of the problems presented.

The final panelist of the evening was Mr. Felix Stumpf who began with an exposition of the present economic condition of the bar, and the reasons for the low earnings of attorneys. Significant among these reasons are the facts that lawyers are "piece-workers" in a mass production society; and that the consumers have been "supermarket-conditioned" by advertising and daily experience to expect the rendering of all goods and services mechanically, and at competitive prices. To offset this dilema, Mr. Stumpf said, "The profession must overhaul antiquated research methods wasteful of their time and energy". With the idea of meeting the requirements of our present day society, he warned that an absence of such remedial action would lead to the further deprofessionalization of attorneys and increasing emphasis on unnecessary specialization.

After a brief analysis of certain risks involved in the use of electronic data retrieval mechanisms, Mr. Stumpf concluded that the unique service rendered by an attorney is based on the broad experience and mature judgment which thus far have only been accomplished by man; and if scientific tools are kept in proper perspective they can provide a constructive contribution to both the legal profession and the human community.

Following this, and all subsequent programs, the floor was opened for questions and general discussion. One question raised was whether, in view of the low income of most attorneys (the 1956 median was $7,833), the practicing lawyer could afford the expense of EDR equipment for research. In response to this, it was observed that lawyers of small means are frequently without private libraries, and use the county or university law library for their research. With this in mind it was suggested by Professor Jones that a network of regional computer centers, available to all attorneys, would eliminate the private economic problem of the insufficient well-to-do attorney.

Saturday morning the conference convened to discuss the relation between "The Language of the Machine and the Language of the Law". The moderator for this session was Dr. George W. Brown, Director, Western Data Processing Center and Professor of Business Administration and Engineering, UCLA, who introduced the program with the observation that even should the conference fail in its attempts to correlate Law and Electronic Data Retrieval, the resultant definition of goals and approaches to legal research might well lead to an improvement of existing nonelectronic legal tools.

Dr. H. P. Edmundson of the Planning Research Corporation, Los Angeles, expounded "The Scientist's Viewpoint", while "The Lawyer's Viewpoint" was set forth by John F. Horty, Esq., Director, Health Law Center, University of Pittsburgh.

Dr. Edmundson began by indicating the differences in the linguistic structures of codes, statutes and cases, which represent different types of language. He then noted that there are a variety of separate languages relevant to the problem, including the machine's internal language and the languages of representation to the machine on both the input and output sides. Within these categories there is a diversity of levels of language such as written, spoken, and quoted. All of these variables then must be accounted for in evaluating the overall problem of transformation of language from its initial to its final and functional stage. He went on to

describe "semiotics" as being divided into three major categories --syntax, semantics and pragmatics--which are related in written expression to structure, meaning, and man, respectively. These were used to represent a continuum of increasing difficulty for science to overcome. To illustrate this, Dr. Edmundson pointed out four areas of automation research in order of their difficulty. They are indexing, abstracting, translating, and deducing. He stated that automation translating is on the least firm ground at present, but may have a future impact on international law, while automation deduction is so difficult as to be non-existent for all present purposes and has given rise to a diversity of opinion as to whether it should be implemented in law or logic or both.

Mr. Horty entered upon a discussion of his project to research a statute dealing with tax exemption for non-profit hospitals. This project, among others involving health law, was undertaken by Mr. Horty under the auspices of the University of Pittsburgh, and resulted in a successful demonstration before the ABA Convention at Washington, D. C. this past summer. The demonstration required a search of all relevant statutes from all jurisdictions in the United States. With the use of the IBM 650, this was accomplished in 6-1/2 minutes, while it took an additional 25 minutes for the machine to print the entire text of the statutes selected.

He stated that at the present time on the health law project he is receiving 30% more material than is relevant to the problem at hand; however, this irrelevancy diminishes in importance when the machine provides the full text of the statutes rather than citations which would lead to further library work, perhaps without results. This type of utilization, Mr. Horty noted, would be most useful for large law firms handling cases requiring a broad scope of research. Therefore he foresees economic difficulties rather than technical problems of great magnitude. He indicated that in addition to researching statutes, this equipment could be utilized in administrative law and foreign law; and, eventually, for statutory drafting, historical research and the determination of strategy by attorneys.

The Saturday morning panel, composed of Dr. David G. Hays, Rand Corporation, Los Angeles; Martin Kalikow, Esq., General Electric Company, New York City, and Addison Mueller, Professor of Law, UCLA, commented upon the preceding presentations.

Dr. Hays set forth the difficulties in standardization of sentence structure and grammar for machine translation; and suggested that the law put its language in neat standard form. He questioned how to connect the meaning of the parts without having similarities verbalized in the text of the input material. He concluded that to overcome these obstacles, the lawyers need first to establish a sound theoretical, or philosophical, structure to provide consistency in their language.

The next panelist, Mr. Martin Kalikow, described a research project which, as a patent attorney for General Electric Co., he conducted. It involved a search to determine patent infringements on the some 11,000 electronic patents owned by GE. He indicated that he had used patent claims in much the same manner as one would use a headnote, and thereby conducted his search on the paragraph rather than the word level. Mr. Kalikow described and preferred the idea of factoring the elements of a concept in glossary form, as opposed to the selection of infrequent terms. By so doing the researcher acquires a greater number of relevant terms which result in fewer problems than are encountered by a yield of fewer terms.

While he had found these techniques helpful in the particular enterprise in which he was engaged, he cautioned that such usage would be limited by the degree of specificity required by the utilizing discipline.

At this point Professor Mueller said he was unable to accept Dr. Hays' proposal that the language of the law be altered to accomodate the needs of the machines. Aside from whether or not such an undertaking could be done, Mueller expressed a strong opinion that it should not be done. This was not a rejection of language alteration for the sake of improvement, but rather a denial of any rigid philosophical structure which would, by demanding conformity, constrict the growth and flexibility of the law. He concluded that science must meet the flexibility standards of the law, for should the converse occur the law would stagnate as public policy became subordinated to notions of "stare decisis".

The Saturday afternoon session convened to probe the relationship of "Logic and Law". The principal speaker was Professor Layman E. Allen of the Yale Law School. Dr. Foster R. Sherwood, Vice-Chancellor and Professor of Political Science, UCLA, moderated the panel composed of Alonzo Church of Princeton University, Visiting Professor of Philosophy, UCLA; Gerald Estrin, Professor of Engineering, UCLA; Reed C. Lawlor, Esq., of Los Angeles, Chairman of the ABA Electronic Data Retrieval Committee, and Murray L. Schwartz, Professor of Law and Assistant Dean, UCLA School of Law.

Professor Allen's presentation predicated that "modern" logic represents an invaluable tool which lawyers at the present time either are not aware of, or have chosen to ignore. In addition to possible immediate use in the drafting and interpretation of written documents, he advocated the future potential use of logic as a means of more precise communication among lawyers, thereby diminishing the number of disputes which arise from misunderstanding.

He suggested that the lawyer look upon symbolic logic as an artificial language created to facilitate the precise communication of ideas, and noted that prerequisite to this goal is the construction of specified criteria as to vocabulary and syntax. The resulting precision can be used by the attorney to increase either the clarity or ambiguity of his discourse in a "natural language" such as English. Conversely, the translation from English brings an awareness of syntactic ambiguities which can be controlled by techniques analogous to those used by logicians.

Professor Allen identified one relevant caveat limiting the use of logic in the law when he said, "When viewed as a language, it should be evident that there is nothing in logic any more than in any other language that offers criteria for how a given legal controversy ought to be resolved. Criteria that are other-than-logical are needed for resolving legal disputes."

He then went on to indicate specific uses for logic systems in the law, including drafting, interpreting, and, potentially, electronic data retrieval. In concluding, Professor Allen admonished the legal profession for its neglect of this "relevant intellectual tool", and suggested the possibility of the establishment of an "intelligence center" which would continuously appraise the impact of current scientific and technological developments on the law.

The first panelist was Professor Alonzo Church who summarized three ways in which it had been suggested that modern logic might contribute to law. The first of these was the use of propositional calculus and logic of quantifiers in clarifying complex documents or sentences intended for communication. Professor Church was of the opinion that the extremely elementary logic applicable in these situations would not be explicitly used so much as implicitly used, and that, in considering the specific statutory problems presented by Mr. Allen in his address, he had himself used a case by case approach rather than an actual formulation in the symbols of propositional calculus. He went on to say that while training in elementary logic would improve this process, the types of problems requiring such analysis are not peculiar to the law. He added that he would of course make a general recommendation of such universally applicable training.

The second possible application proposed was to devise a theory as to what the legal process consists of. This was completely rejected by Professor Church on the grounds that modern logic in its present stage doesn't have the tools to do this. He went on to say that the law is not a single process but a complex of infinitely variable processes and human limitations preclude any possibility that the body of the law will be either complete or consistent. Even if it were possible, the impracticality of such an undertaking would negate its value, and even the use of various kinds of modal logic provide only a very remote possibility of application to the law.

In the third, and final, area of suggested applicability, the automatic retrieval of information, Professor Church admitted to complete confusion. While he stated that he had frequently heard the conclusion stated that such application could be accomplished, he had not heard one specific example of how this might be accomplished. After recognizing a need for some application of logic to the "crude business" of searching all existing documents, and confessing to a vague feeling that perhaps modern logic could be helpful somehow, he was compelled to end his comments with a request to the assemblage for a single specific example of how mathematical logic might advance the process, or organization, of automatic data retrieval. None was suggested.

Saturday evening, Justice Lee Loevinger of the Minnesota Supreme Court spoke on "The Element of Predictability in Judicial Decision Making". He directed his comments to two aspects of this problem: first, the question of the degree to which judicial decisions are in fact predictable, either actually or theoretically; and, second, the question of what methods are available for attempting such prediction, particularly objective methods capable of explication, communication, and replication.

Justice Loevinger indicated that what is meant by legal prediction is something sufficiently specific to be capable of empirical falsification or verification. This presently exists in the overview; that is, it can be accurately predicted that X% of burglars brought to trial in a given jurisdiction will be found guilty. Of greater interest and potential utility is the prediction of judicial action in a particular case; however, here there are many complex contributing variables such as the character and degree of the remedy sought.

The speaker continued that it is frequently assumed that there can be no measure of probability as regards a single case because of the uniqueness of each case; but no case capable of consideration or discussion is wholly unique or it would follow that we would have no way of either

conceiving or discussing it. He suggested that by the use of actuarial tables, similar to those used by insurance companies, and examination of the specific case to determine its apparent position in the frequency distribution of the table, we can arrive at a conclusion which can be acted on with success; this would seem to furnish significant meaning for the term "probability".

Justice Loevinger compared the clinical and statistical methods of predicting adjudication. Among the techniques considered by him were statistical analysis as well as quantitative, categorical and comparative clinical analysis. However, he felt that these were not developed at present to a point of great utility, and consequently offered several alternative approaches to the problem of predicting judicial action.

The first of these was a sample response survey, where a sample of the record of a given case would be presented to a number of lawyers for individual determinations of the issues therein. This technique, he conjectured, would give a more general and consistent predictive value than any of the quantitative methods previously attempted; and at the same time furnish an operational definition for a probability prediction as to the outcome of a single case. A second method, also using a panel of attorneys, would be content analysis and comparison or analogy. A determination of the instant case would be reached, "either by showing close analogy--or lack of it--to a precedent, or by comparison of the number of pivotal factors in the case at bar with those of particular precedents". The final method suggested was the ordinal scale ranking of cases. Here the dominant element or pivotal factors would be given a value rank on a continuum, and the case at hand need only be fitted in the scale to arrive at a probability determination. This he concluded would be easier to establish than cardinal values, and would be a more powerful tool, due to its ease of use and general application, than any method thus far suggested.

In explaining the rationale of decision making Justice Loevinger summarily rejected the theories of yardstick determination and personal predilection of the judge at the time of decision. However he did point out the difficulties of rational explanation in determining the credibility of witnesses, in deciding a point which lies in the overlap of opposing legal principles and in cases of public policy where the court is required to create new law. In the vast majority of instances, however, determination is reached by analysis of the elements which are relevant to given issues, the evaluation or assignment of weights to these elements, their application to specified facts and reconciliation with the existing body of law.

Justice Loevinger concluded his remarks by sketching the outlines of future development, and determining that the processes of legal analysis, prediction and decision are inextricably interwoven with the processes of legal logic and data storage and retrieval. He articulated the need for the application of modern scientific and logical techniques to the field of law, and defined the ultimate task as nothing short of devising a system for describing all aspects of human behavior. Therefore, he committed himself with certainty only to the conclusions that this function shall never be discharged perfectly, or even adequately, and that earnest and diligent application to this problem will result in significant progress toward securing a better world.

The Sunday morning session, "Future Research Projects", was chaired by Arnold I. Dumey, Esq., of the New York bar, an expert in the

use of computers generally. The panel was composed of Dr. Sydney M. Lamb, University of California at Berkeley; Dr. Myron Tribus, UCLA Professor of Engineering; and Edgar A. Jones, Jr.; UCLA Professor of Law and Chairman of the Conference.

The consensus of the conference, expressed at this time by various speakers on the panel and from the floor, was that the application to the law and the administration of justice of electronic processes is feasible. The problems will require considerable research at the university level. Two conclusions appeared: one, that linguistic research will be a major necessity; two, that the legal profession is going to have to reexamine the basic jurisprudential assumptions of the law. *

Irwin Chasalow
Second year law student
UCLA School of Law

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* The proceedings of the UCLA National Conference on Law and Electronics are being published by Matthew Bender & Company.

3. REVIEWS AND ABSTRACTS

3a. The Two Cultures and the Scientific Revolution by C. P. Snow (Cambridge Univ. Press, 1959)

C. P. Snow is both a scientist and a novelist. As such, he feels he has been living in two different cultures - the scientific and the literary. He says he has observed that although scientists know something of the literary culture - at least how to read and write - literary intellectuals do not have any equivalent knowledge of the elements of science. The intellectual life of western society is increasingly being split into two polar groups. The scope and significance of this is the subject of the lectures published in this small book.

To ask for a description of the Second Law of Thermodynamics is the scientific equivalent of asking: Have you read a work of Shakespeare's? Yet seldom do even the most educated non-scientists have any familiarity with this fundamental physical principle. (For a brief description of the Second Law of Thermodynamics and a suggestion as to a possible significance for law, see Loevinger, An Introduction to Legal Logic, 27 Ind. L. J. 471, footnote 102.) There are numerous other similar examples. The total incomprehension of science is more pervasive than we realize. This tends to give our general culture not merely an unscientific, but even an anti-scientific attitude. This, in turn, deprives us generally of many advantages of science: a rigorous logic; a high level of conceptualization; a respect for facts as a moral value; and, finally, the ability to utilize the scientific revolution of our time to meet the insistent demands of that large part of the world which lags in physical production.

Snow clearly declares that it will be necessary for the western world to do better in this respect if Russia is not to establish world leadership and dominance. On specific points he is a bit vague, but he attempts to cover a wide horizon in a very brief work. Regardless of specific means, his central point is clear. "Closing the gap between our cultures is a necessity in the most abstract intellectual sense, as well as in the most practical. When these two senses have grown apart, then no society is going to be able to think with wisdom."

3b. The Logic of Modern Physics by P. W. Bridgman (Macmillan, 1927)

This book, which is now a classic among scientists who are interested in the broader view of their own field and among non-scientists who are interested in the intellectual foundations and implications of science, furnishes an excellent bridge between "the two cultures" of these groups. Professor Bridgman examines both traditional and contemporary physical concepts from the viewpoint of logical analysis and demonstrates that much of the advance in physical science stems from the adoption of more workable concepts of physical phenomena, which he characterizes as "operational."

Probably the most notable contribution of this book is its exposition of the "operational" viewpoint. Traditionally many physical concepts were defined in terms of properties. The modern attitude toward physical concepts

is that they are defined by the set of operations that corresponds to their use. If the concept is physical, as of length, it is defined by physical operations of measuring. If the concept is mental, as in mathematics, it is defined by the mathematical operations to which it corresponds. Physical concepts which cannot be applied or tested by any operation are simply meaningless. Thus any hypothesis that everything in the universe is getting larger or smaller simultaneously and in uniform proportion cannot possibly be tested or applied and is meaningless in any rational discourse. By the operational analysis some of the older concepts of physics (such as ether) lose meaning and utility, and many other concepts reveal unexpected aspects in the required re-definition.

Professor Bridgman examines in some detail the operational significance of some technical concepts, such as electrical field, force and mass, and some of the quantum phenomena, and many more familiar concepts, such as light, energy, velocity, space and cause. The discussion involves scarcely any mathematics, but much of it does assume some sophistication in modern physical theory. However, any reasonably educated reader who is willing to make the effort should be able to understand most of what is said.

No summary can begin to do justice to the scope and refinement of the reasoning from the operational viewpoint as applied to physical concepts by the logic of modern science. However, some of the consequences may be noted as of general significance. The operational viewpoint makes clear that all knowledge is relative. Knowledge is, of course, relative to the operations selected for the description of reality. But, more than this, it is also relative to the units and instruments selected for measurement. A more rigorous analysis reveals other elements of relativity. Most physical concepts are inextricably related to other concepts. For example, it seems impossible to construct a clock without taking some account of space, so that the measurement of time inevitably involves the measurement of space.

Another consequence of the operational character of concepts is that it is quite possible, even disquietingly easy, to invent expressions or ask questions that are meaningless. If any question has meaning it must be possible to find operations by which it may be answered. Where it is found that the operations cannot exist, the question has no meaning. However, even to say that a question is meaningless is significant, for this tells us that nature cannot be described by the operations that would be implied by such a question.

Professor Bridgman's comment on this point is certainly challenging, and probably cogent. "I believe that many of the questions asked about social and philosophical subjects will be found to be meaningless when examined from the point of view of operations. It would doubtless conduce greatly to clarity of thought if the operational mode of thinking were adopted in all fields of inquiry as well as in the physical. Just as in the physical domain, so in other domains, one is making a significant statement about his subject in stating that a certain question is meaningless."

There is certainly much in modern scientific theory and procedure that has remote relevance to law, at best. However, the basic logical insights that have made modern physical science the potent and rigorous discipline that we know it to be may, if understood and utilized by those concerned with the social and legal problems of the world, ultimately

prove to be the greatest contribution of science to the welfare of mankind.

Lee Loevinger
Minnesota Supreme Court

3c. Juristische Logik
by Ulrich Klug (Springer Verlag, Berlin, 2nd Rev. Ed., 1958, 164 pp.)

Klug discusses the role of logic in law from a heretofor not generally exploited angle, and by placing his approach on modern rather than traditional logic, enters a field of investigation which has a promising future. To be sure, this work contains no revelations to the professional logician, but it should arouse the interest of readers who feel a need for the simplification of legal language and who desire to get acquainted with aspects of practical uses of modern logic in the field of law.

The first part of the book is a general introductory discussion of the subject of juridical logic--defined as that portion of modern logic which is amenable to practical applications in jurisprudence--along the following lines. Deductive methods in juristic arguments have long been practiced, but their development was handicapped because of limitations of the natural languages. In dealing with logical relations of a complicated structure, expressions in conversational language and rules of conventional grammar are no longer adequate for operations of reasoning. To overcome this difficulty, symbolic expressions and computational methods have been developed and successfully applied, originally in mathematics. But there is no reason to assume why such methods could not be used also in non-mathematical fields or, generally, in any field in which ideas are talked about in conversational language. Modern or symbolic--as distinguished from classical or Aristotelian--logic offers a method of computational operations of general applicability, employing symbols devoid of material content and displaying the basic structure of the reasoning process. Such method is already widely used with ever increasing momentum in other sciences; it is destined to find important tasks to fulfill in jurisprudence as well.

The second part contains the elementary exposition of the fundamental theories of modern logic, comprising propositional calculus, functional calculus, calculus of classes, calculus of relations and theory of definitions. Although the presentation of the rich material covered by these subjects may not be taken as a substitute for a basic textbook, some important topics, such as the analysis of truth functions through truth tables, are rendered with adequate details for the beginner. The value and significance of the entire second part lies in its arrangements whereby abstract symbolic expressions are followed by illustrative examples of application drawn from subjects in the field of law, thus enabling the newcomer to take the first plunge into formal logic without first becoming discouraged by abstract theories.

The third part presents and analyses several forms of deductive argumentation generally used in law. The discussion is quite detailed and based on classical as well as modern approaches, adequately illustrated with applications to legal problems. The following forms are

covered: argumentum a simile, argumentum e contrario, argumentum a maiore ad minus, argumentum a minore ad maius, argumentum a fortiori, argumentum ad absurdum. Not covered are fallacies and contradictions, in connection with which the reader is referred to specific publications. The concluding section is devoted to arguments of interpretation, defined as forms of arguments based not on logical operations but on identifying or establishing the sources of legal theories or axioms used as starting points for the arguments. Klug classifies these from several angles, as for example subjective and objective methods of interpretation, the former being based on the will of the legislator, the latter on teleological axioms consciously or unconsciously assumed at the time of interpretation.

The fourth part presents two philosophical issues: the need for axiomatically systematizing the law, and the role of teleology. In connection with axiomatic systematization (based on unproven axioms, derived theorems, basic concepts and defined terms) Klug remarks that jurisprudence as a science has a need for, and is amenable to, systematization the same as any other science where such systematization has already been carried out; such systematization may be introduced effectively only with the help of modern logic, but care should be exercised to be sure that the significance of modern logic is not overemphasized; modern logic alone and in itself is not sufficient, but it is an indispensable tool. In connection with teleology, the significance of a formally systematized law established with the help of logic must be recognized as relative, since by the rules of logic it is replaceable, but it is bound teleologically to an ultimate power which establishes law as a moral force; this functional interlocking of logic and teleology leads to further problems not yet fully explored by legal philosophy.

An appendix containing axioms and rules of the Hilbert-Ackermann functional calculus of first order, and indices of authors, subjects and symbols conclude the volume.

Nicholas A. Vonneuman
Member of the Pennsylvania Bar

Some lawyers stress the value of that thing called 'lucidity', unaware that what they are really extolling is 'familiarity', and that for 'true' lucidity the fuzzy vague words of ordinary speech need replacement by more precise symbols.

J. L. Montrose
Dean of the Faculty of Law
at Queen's University
Belfast, N. Ireland

5. PROBLEMS

5a. INTERPRETATION OF CALIFORNIA PIMPING STATUTE
(Problem stated in MULL 60M-5a)

1. "... my first reaction on reading the California pimping statute problem, 60M-5a, would be to deny the motion to set aside the information on the ground that legislative draftsmen are presumed to be unable to express themselves clearly, even though it is apparent that the defendant did not solicit compensation for soliciting for the prostitute. At second blush I think that my original conclusion and the reasons therefor are valid but that the reasons would be unacceptable to a court."

John E. Scheifly
Member of the California Bar

2. "Under the California statute there are two classes of persons who are guilty of the crime of pimping. One class is the male person, who lives at least in part on the earnings of a prostitute, knowing at the time that she was a prostitute. The other class is a male person who 'solicits compensation for soliciting for the girl'or who 'receives compensation for soliciting' and there is no evidence here of compensation asked or received. Anyone who says that the last class should be comprised of those who 'solicit for her' and those who 'receive compensation for soliciting for her' could only be from the DA's office. The motion should be granted."

Frederic Johnson
Member of the Texas Bar

3. The reader may recall that in the problem as posed in MULL 60M-5a, conclusive evidence had been presented at the preliminary hearing to show that the defendant solicited a customer for a woman whom he knew to be a prostitute. Upon arraignment the defendant's counsel moved to set aside the information. The applicable statute was Sec. 266h of the California Penal Code, which reads:

> "Any male person who, knowing a female person is a prostitute, lives or derives support or maintenance in whole or in part from the earnings or proceeds of her prostitution, or from money loaned or advanced to or charged against her by any keeper or manager or inmate of a house or other place where prostitution is practiced or allowed, or who solicits or receives compensation for soliciting for her is guilty of pimping, a felony, ..."

Readers Johnson and Scheifly correctly perceive that the syntax of the California pimping statute is indeed ambiguous. Attention is called to two different ambiguities, the resolution of one of which is crucial for determining whether or not the defendant's motion to set aside the information should be granted.

It is interesting to ask whether some procedure can be devised for the systematic detection of such syntactic ambiguity. Such a detection procedure would be useful both when the statute is being drafted (alerting the draftsman to make a choice about whether such ambiguity is to be elimin-

ated from or intentionally incorporated into the statute) and when the statute is being interpreted (aiding the counsel or judge to array the possible alternative interpretations in his efforts to decide the appropriate meaning to be given to the statute). This writer's beginning effort at devising such a detection procedure is described in an article entitled "Toward a Procedure for Detecting and Controlling Syntactic Ambiguity in Legal Discourse," forthcoming in the JOURNAL OF LEGAL EDUCATION.

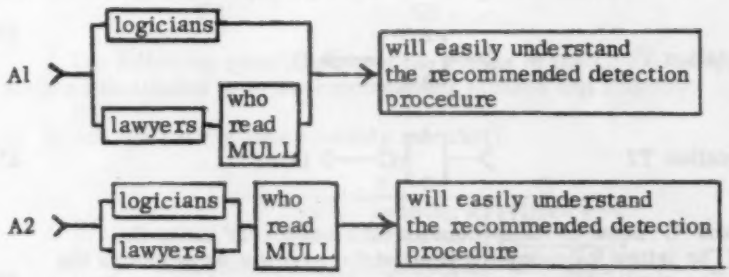
It may be helpful to give a brief description of this detection procedure before applying it to the California pimping statute. The method is described by applying it to a simple example. Consider the following statement:

S1 Logicians and lawyers who read MULL will easily understand the recommended detection procedure.

Does S1 say that all logicians will easily understand the recommended detection procedure, or does it merely say that those logicians who read MULL will easily understand the procedure?

The answer to this question will, of course, depend upon how the syntax of S1 is interpreted. S1 may be interpreted so that the phrase 'who read MULL' qualifies only the word 'lawyers'. Alternatively, S1 may be interpreted so that 'who read MULL' qualifies both the word 'lawyers' and the word 'logicians'. Each interpretation leads to a different answer to the question posed.

The following pair of arrow-diagrams are intended to represent these two different interpretations:



Alternative interpretation A1 indicates that all logicians easily understand, whereas A2 indicates merely that those logicians who read MULL easily understand. That is, in A1 there is an unbroken path through the diagram which reads:

"Logicians will easily understand the recommended detection procedure."

But, in A2 there is no such unbroken path; instead the analagous path reads:

"Logicians who read MULL will easily understand the recommended detection procedure."

In general, to determine whether a sentence describing a certain situation is asserted by a specified interpretation of a text, inspect the arrow diagram of the interpretation to see if this sentence can be read in an unbroken path through the diagram.

It is convenient to use an abbreviation of the text being tested by this detection procedure. One method of abbreviating is as follows:

S1.1 (Logicians) and (lawyers) (who read MULL)
A B C

(will easily understand the recommended
D

detection procedure).

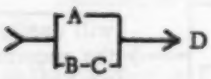
If S1 is abbreviated as indicated in S1.1, it is easy to represent the question about its ambiguity in an abbreviated form as follows:

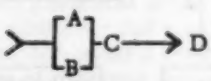
Q1 Which alternative was probably intended?

A1 ... -[A / B-C]- ...

A2 ... -[A / B]-C- ...

The complete arrow-diagrams can also be represented in an abbreviated form:

Interpretation T1 

Interpretation T2 

Let 'A', 'B', and 'C' name certain "conditions"; and let 'D' name the consequent. (The letter following the head of the arrow always names the consequent.) The similarities, as well as the differences, between interpretation T1 and interpretation T2 are summarized in the tabulation that follows:

Situation	Conditions fulfilled in the situation	Does consequent D follow from S1 according to the interpretation? (1 indicates yes, 0 indicates no) T1	T2
1	A B C	1	1
2	A B -	1	0
3	A - C	1	1
4	A - -	1	0
5	- B C	1	1
6	- B -	0	0
7	- - C	0	0
8	- - -	0	0

An inspection of the arrangement of ones and zeros in the above tabulation indicates that in situation-2 and in situation-4, the answer given depends on which alternative, T1 or T2, is accepted as the appropriate interpretation; whereas in all other situations, the same answer is given no matter which interpretation is accepted.

In analyzing the California pimping statute the following abbreviations will be convenient:

(Any male person) (who, knowing a female person is a prostitute,)
A B

(lives) or (derives) (support) or (maintenance) (in whole) or (in part)
C D E F G H

(from the) (earnings) or (proceeds) (of her prostitution,) or (from money)
I J K L M

(loaned) or (advanced) (to) or (charged against) (her by any) (keeper) or
N O P Q R S

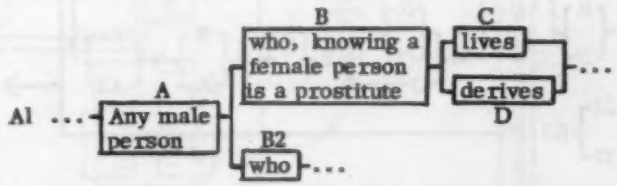
(manager) or (inmate) (of a) (house) or (other place) (where prostitution is)
T U V W X Y

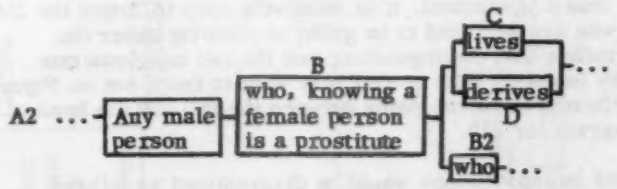
(practiced) or (allowed,) or (who) (solicits) or (receives) (compensation
Z A2 B2 C2 D2 E2

for soliciting) (for her) (is guilty of pimping, a felony,) ..."
F2 G2

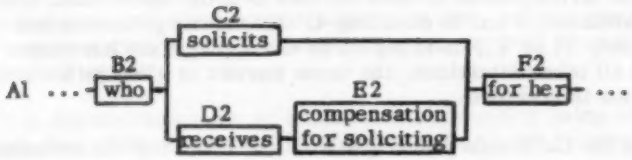
The following questions about the syntax of the California pimping statute are alluded to in the comments of Johnson and Scheifly:

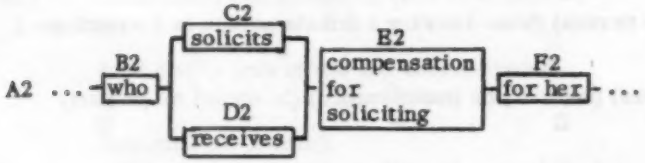
Q1 Which alternative was probably intended?





Q2 Which alternative was probably intended?

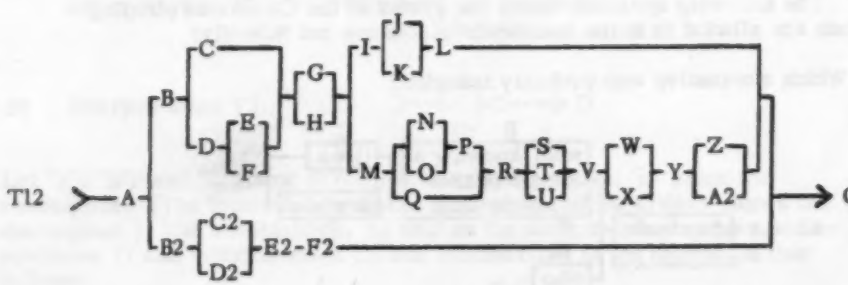




This pair of ambiguities gives rise to the following four possible interpretations of the California pimping statute:

Interpretation	Answer to Q1	Answer to Q2
T11	A1	A1
T12	A1	A2
T21	A2	A1
T22	A2	A2

Johnson's interpretation of the statute is T12, and is represented by the following arrow-diagram:



When the statute is thus diagrammed, it is relatively easy to detect the 230 classes of persons who are declared to be guilty of pimping under the California statute, rather than distinguishing just the two conglomerate classes mentioned by Johnson. The reader may wish to trace out on Figure 1 a few of the 230 different unbroken paths between the tail and the head of the arrow of the diagram for T12.

The other three interpretations would be diagrammed as follows (showing now only those parts in which the diagrams differ):

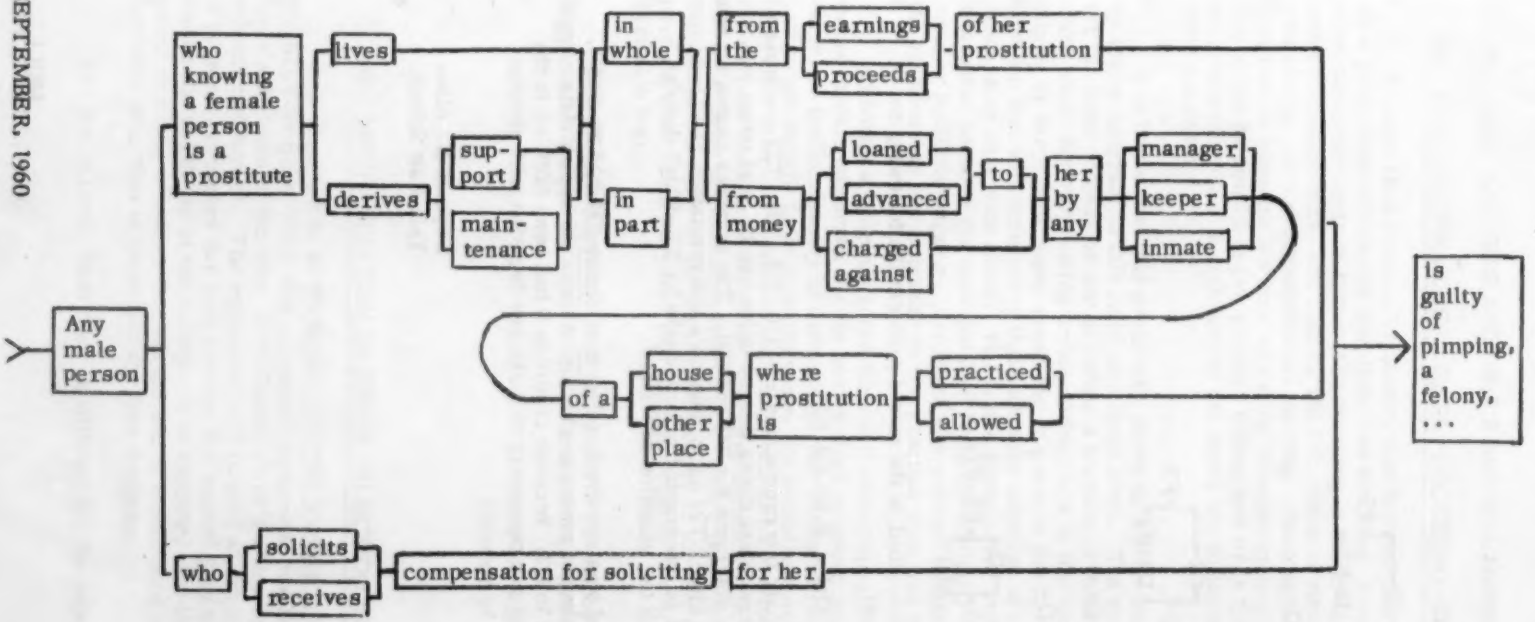
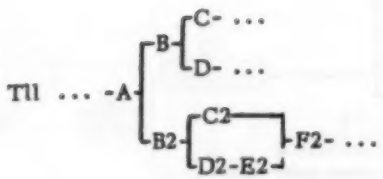
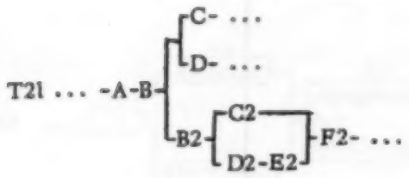
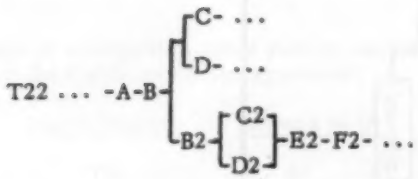


Figure 1

INTERPRETATION T12







In the situation described in the stated problem the following set of conditions were fulfilled:

SITUATION-A.B.B2.C2.F2

An examination of the four interpretations --- T11, T12, T21, T22 --- makes it evident that the sentence describing this situation can be read on an unbroken path only in the diagrams for T11 and T21. The sentence cannot be read on an unbroken path in either T22 or in Johnson's interpretation (T12), because the path from C2 to F2 is interrupted in both cases by E2, which denotes a condition not fulfilled in the situation described.

The problem posed was resolved in People v. Smith 279 P2d 33 (1955). The court decided (as Johnson recommends) that A2 was the appropriate alternative with respect to Q2. Because condition B had been fulfilled in the situation involved, it was not necessary to make any decision with respect to Q1.

Layman E. Allen
Yale Law School

6. READERS' LETTERS AND OTHER MISCELLANEOUS ITEMS

6a. PHILADELPHIA LEGAL DATA PROCESSING SOCIETY

A Legal Data Processing Society was formed recently in Philadelphia by a group drawn from law practice, law teaching, management of institution computer centers, university teaching in the computer field, and computer manufacturers, and running the full gamut of sophistication in data processing. At the organizational meeting, plans were laid for a continuing program to acquaint lawyers with developments in machine data processing that might be helpful in law practice either now or in the distant future and to inform computer technicians of the areas where lawyers might utilize their creations.

It is hoped that this group will serve as a pilot test of the value of an active program in this field on a local level. The goals of the program for the legal profession are to induce a ferment of thinking from which might come ideas for overcoming technical barriers to the use of computer techniques by lawyers in many areas and to prepare the bar for the significant changes that will accompany their ultimate adoption of electronic data processing on a wide scale. The active enthusiasm with which genuinely interested persons (as distinguished from the curious) responded to the meager publicity suggests that there is a greater demand for information on the relationship of computers to law practice than was suspected.

Although a program committee will select specific projects, potential items include education for the novice (both in group and in the bar at large) on the intricacies of computers, the listing of facets of law practice that might benefit from computer use, the establishment of a clearinghouse of printed material available nationally and of local educational programs, the critical consideration of specific developments affecting the law (like the University of Pittsburgh Health Law Center research technique for statutes), the study of the legal implications of the use of computers by persons other than lawyers, and the sponsorship of a study group in symbolic logic.

Reports of the group's activities will be furnished periodically. Suggestions for projects that might be tried are invited.

Roy N. Freed
Member of the Pennsylvania Bar

6b. MECHANIZATION OF JUROR SELECTION IN NEW YORK

It is reported in 44 JOURNAL OF THE AMERICAN JUDICATURE SOCIETY 39 (July, 1960) that automatic equipment has been installed in the juror's division of the New York County clerk's office for use in the selection of jurors. The equipment will permit an increase in the number of persons processed for jury service and spread jury duty more equitably among the residents of the county. It is expected that the resulting improvements in cross-checking through the use of mechanical equipment will facilitate detection of loopholes for jury dodgers.

Key punch cards have been substituted for the paper jury ballots used

previously. The traditional jury wheel, in use for more than 75 years, has been replaced by machines which:

1. scramble the key punch cards,
2. select jurors' cards at random,
3. write out the minute of the drawing,
4. list the names drawn,
5. prepare panels for the courts, and
6. address, enclose, seal, and stamp the jury summonses.

An entire drawing of 1,300 jurors can be done in 25 minutes. Under the old method, nine clerks would have spent 45 minutes in doing the single task of transcribing the names of jurors chosen from the rotating drum onto the ledger. The manpower saved by the machines will be transferred to the examining section, where the number of persons called for questioning as to their qualifications for service will increase. New York County jurors have been summoned to serve at two-year intervals. With the expanded jury list, the interval is expected to be extended to three or four years.

6c. SYMBOLIC LOGIC AND THE INTERNAL REVENUE CODE

"... I would like to comment somewhat upon the past three issues of MULL. Quite frankly, one of its most fascinating aspects is its bulletin board facet. I am enthralled by some of the work going on in the country which never comes to my attention except through the pages of MULL.

"... One comment with respect to Keith Morrison's letter, 59S-6d, in re the Internal Revenue Code - as you know, I have done quite a bit of work with this and speak from experience albeit coupled with ignorance.

When you first think of applying symbolic logic to a field of law, the Internal Revenue Code seems an ideal field. It is statutory in origin and fairly recent compared with the other fields of law and therefore appears to be finite in scope. Most tax attorneys have nearly all of the materials affecting it collected in a single library and it would seem to be an ideal testing ground for applying symbolic logic. It takes but a few moments of reflection, however, to realize how erroneous the first impression can be. In the first place, the Internal Revenue Code is infinite in scope inasmuch as it affects every conceivable transaction that man or his creatures can engage in from birth through marriage, divorce and death and through every transaction, business or otherwise, that he has been able to devise. What originally appeared to be a finite portion of the law becomes all-encompassing.

Every given section of the Internal Revenue Code is replete with assumptions which are implicit and making these assumptions explicit to permit manipulation of the various terms is a never-ending task since the assumptions implicit in a given section of the Code may or may not be consistent with assumptions implicit in a related section of the Code. Herein lies one of the sources of disagreement and litigation between taxpayers and the Internal Revenue Service.

Thirdly, the Internal Revenue Code proceeds on the basis of characterizing a transaction and then defining the tax consequences of that characterization. The same transaction may be susceptible of several

characterizations and these characterizations do not necessarily have consistent tax consequences. It is this characterization approach, which is also the conceptual basis of most indexing systems such as West Digests, which produces lawyers' dissatisfaction with existing indexes. A person unfamiliar with a given field of law can fail to make the appropriate characterization of his facts and thereby fail to research the appropriate index heading. Thus an attorney who characterizes his cause of action as trover, for example, may fail to realize that his factual pattern may be susceptible of an action for imposing a constructive trust or of an action in assumpsit. This is getting slightly off the track, but essentially I was simply trying to set forth for Mr. Morrison some of the reasons why I have concluded that the Internal Revenue Code is not an ideal pilot project for the study of symbolic logic in the law. I may say that I have taken certain sections out of the Code dealing with estate and gift taxes and applied symbolic logic to them with varying degrees of success. Again these applications involve quite trivial examples of symbolic logic and for all I know may be inconsistent from the viewpoint of a mathematician. . . ."

John E. Scheifly
Member of the California Bar

6d. 1960 EDR COMMITTEE MEETING

EXCERPTS FROM THE MINUTES OF THE MEETING OF THE ELECTRONICS DATA RETRIEVAL COMMITTEE OF THE SECTION OF BAR ACTIVITIES OF THE AMERICAN BAR ASSOCIATION HELD AT WASHINGTON, D. C. ON AUGUST 29, 1960

The meeting was called to order by Chairman Richard F. C. Hayden and a report was given to the Committee by Layman E. Allen on the financial status of MULL. He reported that MULL was in a serious financial situation due to two factors: (1) the fact that the subscription rate of $2 a year was not sufficient to cover the necessary out-of-pocket expenses for publishing the newsletter, and (2) the subscription list had increased so rapidly that even if an increase in subscription rates were made that would provide adequately for the long-range future, there would remain a short-range financing problem during the coming year to pay the costs of publishing issues for which many subscribers have already paid.

It was moved, seconded and carried that Layman Allen be authorized to increase the subscription rates to MULL at his discretion up to $6 per year.

It was moved, seconded and carried that Layman Allen be authorized and directed to get the Board of Directors of the American Bar Association or the other appropriate body within the American Bar Association to authorize the following:

1. Solicitation of advertising.
2. Solicitation of funds from suitable foundations or other sources of grants.
3. Authorization to explore with the American Association of Law Libraries the feasibility of a joint publication.

In this connection, Vincent Fiordalesi volunteered to explore what possibilities there were for getting a contribution to MULL from the American Association of Law Libraries in this connection.

It was reported to the Committee that the question had been raised by the Administrative Staff of the American Bar Association as to whether we had followed the proper procedures in getting MULL authorized and it was moved, seconded and carried that Layman E. Allen be directed to take such steps as are necessary to regularize the relationship of MULL to the American Bar Association.

The next question that was raised was the question of the possibility of the publication of the proceedings of the Panel held on August 29, 1960 at Washington, D. C. It was reported that Callaghan & Co. had offered to print some of the parts of the proceedings on a no royalty basis, but with free copies to Committee members.

The question was raised as to what the effect would be on this of the right to publish the portions of the proceedings in MULL. It was reported by Reed C. Lawlor that Callaghan & Co. had failed to support the Program Committee but that on the other hand the Bureau of National Affairs and one other publisher had given support to the Committee and it was suggested that they should be given first opportunity to publish any proceedings, if there is any credit attached to the publishing of these proceedings.

Robert Wilson was appointed as sub-chairman with the authorization to arrange for the publication of the proceedings on a basis most favorable to the Committee.

It was reported to the Committee that the Chairman had established a laison Committee with the American Association of Law Libraries and that Vincent Fiordalesi, a member of our Committee and also a member of the Association of the American Law Libraries, was Chairman of that laison Committee this year. The question was raised as to whether it was desirable to form a laison Committee also with the American Documentation Society, and after some discussion it was decided to take no formal action in this connection, but the Chairman was authorized to negotiate with the American Documentation Society with a view to possible formal association with them, and if not formal association, then to establish an informal channel of laison.

The next order of business was the election of Chairman for the succeeding year. The name of Reed C. Lawlor was placed in nomination. It was moved, seconded and carried unanimously that the nominations be closed and Reed C. Lawlor was elected Chairman for the succeeding year. Mr. Lawlor immediately appointed Robert Wilson as Program Chairman for the succeeding year and the appointment was accepted.

The question of financing the program of the Committee was raised and it was pointed out that while in the past there had been no dues, that there had in fact been substantial expenses incurred by various members of the Committee and it was moved, seconded and carried that in the subsequent years dues of $10 per year should be required of Committee members. The Chairman was authorized and directed to negotiate with the appropriate body within the American Bar Association for authorization for charging such dues.

The question was raised as to whether or not the Committee should be converted into a subsection so as to enable larger participation in membership at the same time as maintaining a reasonably small governing Committee. In addition, it was discussed as to whether or not it would be desirable to have the Committee move from under the aegis of the Section of Bar Activities to a status of a special committee of the American Bar Association and the Chairman was directed to explore the possibilities of these two positions and to take such steps as are necessary to achieve for us the most desirable administrative status within the American Bar Association.

John E. Scheifly
Acting Secretary

6e. OKLAHOMA BAR CONVENTION DEMONSTRATION

Robert T. Morgan, Professor of Business Law at Oklahoma State University, arranged for a demonstration of electronic data processing equipment as an aid to the practicing attorney at the Oklahoma Bar Convention, November 30, December 1, 1960. The demonstration was sponsored by Commerce Clearing House, Inc.; International Business Machines, Inc.; Economic Status Committee of the Oklahoma Bar; Research Foundation, Oklahoma State University; College of Business, Oklahoma State University; and the Blue-Cross, Blue Shield Insurance Co. Professor Morgan's description of the demonstration follows:

The IBM 305 RAMAC is primarily an accounting machine. It was designed as such and to date has been basically used in that way. However, the accounting approach can, in some instances, be very well adapted to law. In Single Entry Accounting, for example, one must look from the very first entry to the last for the information he desires. Very much the same thing applies in law, for one must search a single facet of law from one end to the other to be sure that all factors have been considered. As the RAMAC makes available to the accountant an instantaneous location of the facts he desires, similarly, the same machine can make available to the attorney information in a minimum of time.

The ability of this machine to go into a record storage of over 10 million bits of information and within 6/10 of one second read out that particular item of information, lends itself most cogently to the problem of the attorney. Recent applications of this machine have resulted in putting together 26 of these file storage units under the command of one interrogation console, which means that 260 million characters of information are available through one single interrogation unit. ...

By the use of a "code", it is possible to interrogate the machine as to the stored legal authorities. The "code" used in this demonstration is based on a "point of law" approach. Each legal proposition that may be a focus of controversy is encoded as a point of law. These are then assigned a number. All pertinent data relating to this particular point is then stored

in the 305 RAMAC. To retrieve this information, it is only necessary to ask the machine, through the "code", to read out all assigned data under that code number.

The machine will accept a "code" and then search the entire disc file for that particular code, in a matter of less than one second. This is accomplished by the 305 RAMAC using the inquiry code and then searching the entire file for such code. It then makes a listing of the information under such code, as is extremely flexible in such search. For example, it is possible with this machine to search for citations; search for citations plus a syllabus or headnote; get citations plus syllabus plus entire text of the decision; get the above plus any dissenting opinions. The person requesting information can specify the extent to which the machine will read out the file. Dissenting opinions, alone, can also be searched from the file, a point the demonstrators believe to be most important. Such a technique would aid a person, who is in the position of urging the court to overturn previous decisions on a particular point of law, as he could search dissents to buttress his position.

Robert T. Morgan
Oklahoma State University

6f. A.L.I. SEMINAR ON ELECTRONIC DATA PROCESSING

The Joint Committee on Continuing Legal Education of The American Law Institute and American Bar Association has announced a three-day Institute Seminar on "Legal Problems in the Use of Electronic Data Processing in Business, Industry and Law" to be held at Washington, D. C. on March 23, 24 and 25, 1961. Matters to be discussed by authorities in the various fields of technology and law will include: The functions and operations of computers and their impact on tort, tax, corporation, labor, contract, banking, sales, antitrust, patent and copyright law, as well as on the law of evidence and trial practice.

Inquiries should be sent to:

The Director
Joint Committee on Continuing Legal Education
133 South Thirty-Sixth Street
Philadelphia 4, Pa.

6g. INCREASE IN SUBSCRIPTION PRICE TO MULL

The rather startling success of MULL during its first year of publication (more than 500 subscribers) has had a number of repercussions. The most embarrassing of these has been a rather acute financial problem arising from the fact that the original estimates about costs of production were far too low. As a result, the Electronic Data Retrieval Committee at its meeting on August 30, 1960, authorized an increase in subscription prices (See MULL 60S-6d). The new rates effective September 1, 1960, are $4 per year and $10 per 3 years.

1h. THE 'ALL' PROJECT (ACCELERATED LEARNING OF LOGIC)

In American education today there is a need for better methods of elementary-school instruction and a need for early development of the skills of deductive reasoning so important in learning mathematics. The ALL Project (Accelerated Learning of Logic), established at Yale University under a three-year grant from the Carnegie Corporation, is an attempt to help meet both of these needs by

1. adapting and developing further certain new methods of instruction and
2. introducing mathematical logic into the elementary-school curriculum.

In the studies undertaken in the ALL Project there will be investigated

1. methods based on those developed by Professor B. F. Skinner of Harvard, and
2. a series of games, which is currently being developed by the ALL Project research staff.

The primary objective of the ALL Project is to develop and test materials and methods for teaching mathematical logic to elementary-school children. It is anticipated that the methods developed can be adapted to subject-matters other than logic, but this adaptation is not an immediate objective of the ALL Project.

A "Skinner learning program" (in the terminology used here) presents subject matter which requires the learner to make written responses to the material as it is presented. This method of presentation insures the learner's active participation. Answers are presented immediately after a response is made; there may be a representation of those parts of the material where incorrect responses occur. The Skinner learning programs are intended to be self-contained and self-explanatory, so that the learner while working through a program requires neither supplementary texts nor guidance from a teacher. This method of presentation allows each learner to proceed at his own pace. Since there is immediate reinforcement of correct responses, and immediate correction of inappropriate responses, a Skinner learning program affords one of the chief advantages of a private tutor. A record of the learner's errors shows the teacher or programmer where the presentation is weak or obscure and where each learner has particular difficulty. Skinner learning programs for mathematical logic will be especially useful, because they can be used in training teachers as well as in teaching students; such training of teachers will probably be necessary before this novel subject-matter can be introduced into the elementary-school curriculum.

The series of games that is being developed has as its goal the teaching -- in a competitive and entertaining atmosphere -- some of the symbol-manipulating skills of logic. The games are graduated in their complexity. The player is taught first how to form sentences in a special "language" and, then, how to show which of these sentences are "true", where the "language" is a system of formal logic and the "true sentences" are theorems. The following factors seem likely to make the games especially suitable for facilitating learning:

1. The learning of logic results as a by-product of an activity

which is enjoyable in itself.

2. Although young children enjoy these games, the more intricate ones pose a genuine challenge even for adults.

3. In the play of the games there is no waiting time. Each player proceeds at his own pace throughout the entire time of play. The more adept player is not delayed by those who play more slowly.

4. Everyone else in these games learns from the best player. His strategies are displayed openly so that all others may learn to adopt them. In effect, the best players act as teachers, although they are not formally assigned this role by the rules of the games.

5. The games are so ordered that each new game is slightly more intricate than the previous one and each later game uses the skills learned in earlier games.

6. The games emphasize individual rather than collective decision making. Each player plans and executes his own strategy independently in order to achieve specified goals.

7. The games are flexible both in the number of persons who may play (two or more) and in the length of time for a game to be played (five minutes or more).

The number of such games and the range of the subject-matter that can be taught by them is still an open question. It does seem clear, however, that even for mathematical logic, the number of such games will be quite large. The initial games in the series have already been developed and tried informally with groups of children and adults, including several faculty members and graduate students of Yale University; their responses have been enthusiastic.

The principal investigator for the ALL Project is Layman E. Allen, Assistant Professor of Law at Yale University. Frederic B. Fitch, Professor of Philosophy at Yale University, will serve as senior consultant. The research staff includes Robin B. S. Brooks, James W. Dickoff, and Patricia A. James.

Citations to MULL

To keep citations brief, the following system will be used in making citations to MULL. Example: MULL 60M-6c#

60 Volume number -- coincides with year of publication
M Month of publication -- M March S September
J June D December
6 Section number
c Subsection number
Page number (if necessary)

The first issue of MULL appeared in September, 1959.

Since one of the major purposes of MULL is to provide a vehicle for the exchange of information about

1. the uses of modern logic in law and

2. modern methods of information retrieval in law

readers are urged to send in news about research in progress that will be appropriate for inclusion in MULL.

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